SAE INTERNATIONAL

AEROSPACE STANDARD

AS4052™ REV. B

Issued 1994-04
Revised 2008-11
Reaffirmed 2021-02

Superseding AS4052A

(R) Gland Design: Scraper, Landing Gear, Installation

RATIONALE

AS4052B has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

This SAE Aerospace Standard (AS) covers an alternate gland design for the installation of scraper/ wiper rings in the lower end of landing gear shock struts for the purpose of contaminant exclusion.

The defined scraper gland covered by this document, as shown in Table 1, is a variant of AS4716, the accepted gland standard for MS28775, O-ring packing seals. Piston rod diameters, gland internal diameters, groove sidewall angles and the surface finish are all defined by AS4716, but the gland outer retaining wall diameter is changed. The traditional scraper design installed into the glands detailed in Table 1 typically utilize components made from urethane or nitrile materials. These scraper designs, while still acceptable, must be reviewed in consideration to deicing, cleaners and disinfectant fluids applied to or in contact with the landing gear, as the materials of construction for the installed scrapers may not be compatible to these fluids. Exposure of the scraper to incompatible fluids is likely to reduce the performance of the scraper.

In addition, an alternative scraper gland is also covered by this document and shown in Table 2. It is also a variant of AS4716, however this gland has a reduced atmospheric gland lip and profiled lead in geometry to allow for a PTFE jacket metal spring energized scraper to be installed. The advantages of the PTFE jacket metal spring energized scraper design is that the materials of construction are chemically inert, greatly reducing the possibility of negative performance due to incompatibility with deicers, cleaners and disinfectant fluids.

AS4088 is similar to the hardware design in Table 1 of this document, which was developed by SAE A-6 for flight control and general-purpose cylinders. It differs from this document primarily by the clearance between the rod (piston) and outer gland wall.

1.1 Purpose

This document is intended to present a groove which will accommodate an improved scraper/wiper ring assembly design and is not intended to obsolete the MS33675 gland standard.

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1.1.1 Design Practice

Historically, the most common scraper gland has been an MS33675, which accepted either a MS28776 bronze scraper or a comparable TFE scraper. It has been noted that this arrangement is deficient in two aspects: the metal scraper ring is split, allowing contaminants to pass through and around it; and, being installed in a very abbreviated gland, the scraper frequently dislodges under conditions of shock strut deflection. An improved metal, plastic, or elastomeric endless scraper ring would require additional gland volume with greater retaining surfaces than specified by MS33675 and as detailed in this specification.

The recommended gland geometry for AS4052 is separated into Type 1 and Type 2 as shown below.

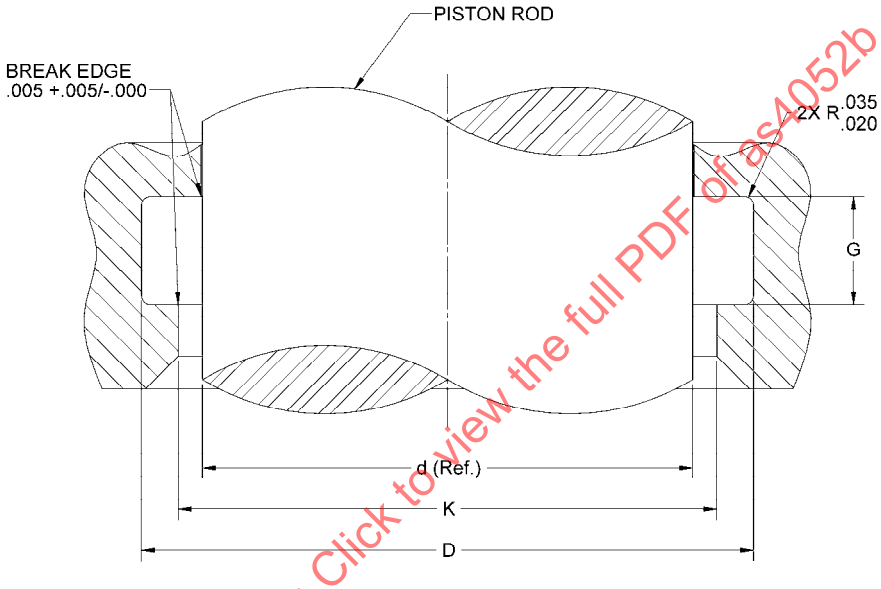

FIGURE 1 - TO ACCOMPANY TYPE 1 IN TABLE 1

TABLE 1 - TYPE 1 GLAND DIMENSIONAL INFORMATION
ALL DIMENSIONS IN INCHES

Gland Size Code Dash No.	∅d Piston Rod O.D. Ref. +0.000 –0.002	∅D Gland I.D. +0.002 –0.000	∅K Retaining Lip I.D. +0.000 –0.010	G Gland Length +0.010 –0.000
325	1.498	1.870	1.646	
326	1.623	1.995	1.771	
327	1.748	2.120	1.896	
328	1.873	2.245	2.021	
329	1.998	2.370	2.146	
330	2.123	2.495	2.271	
331	2.248	2.620	2.396	
332	2.373	2.745	2.521	
333	2.498	2.870	2.646	
334	2.623	2.995	2.771	
335	2.748	3.120	2.896	0.334
336	2.873	3.245	3.021	
337	2.997	3.369	3.145	
338	3.122	3.494	3.270	
339	3.247	3.619	3.395	
340	3.372	3.744	3.520	
341	3.497	3.869	3.645	
342	3.622	3.994	3.770	
343	3.747	4.119	3.895	
344	3.872	4.244	4.020	
345	3.997	4.369	4.145	
346	4.122	4.494	4.270	
347	4.247	4.619	4.395	
348	4.372	4.744	4.520	
349	4.497	4.869	4.645	

TABLE 1 - TYPE 1 GLAND DIMENSIONAL INFORMATION
ALL DIMENSIONS IN INCHES
(CONTINUED)

Gland Size Code Dash No.	∅d Piston Rod O.D. Ref. +0.000 –0.003	∅D Gland I.D. +0.003 –0.000	∅K Retaining Lip I.D. +0.000 –0.010	G Gland Length +0.010 –0.000
425	4.497	4.974	4.686	
426	4.622	5.099	4.811	
427	4.747	5.224	4.936	
428	4.872	5.349	5.061	
429	4.997	5.474	5.186	
430	5.122	5.599	5.311	
431	5.247	5.724	5.436	
432	5.372	5.849	5.561	
433	5.497	5.974	5.686	
434	5.622	6.099	5.811	
435	5.747	6.224	5.936	
436	5.872	6.349	6.061	
437	5.997	6.474	6.186	
438	6.247	6.724	6.436	
439	6.497	6.974	6.686	
440	6.747	7.224	6.936	
441	6.997	7.474	7.186	0.475
442	7.247	7.724	7.436	
443	7.497	7.974	7.686	
444	7.747	8.224	7.936	
445	7.997	8.474	8.186	
446	8.497	8.974	8.686	
447	8.997	9.474	9.186	
448	9.497	9.974	9.686	
449	9.997	10.474	10.186	
450	10.497	10.974	10.686	
451	10.997	11.474	11.186	
452	11.497	11.974	11.686	
453	11.997	12.474	12.186	
454	12.497	12.974	12.686	
455	12.997	13.474	13.186	
456	13.497	13.974	13.686	
457	13.997	14.474	14.186	
458	14.497	14.974	14.686	
459	14.997	15.474	15.186	
460	15.497	15.974	15.686	

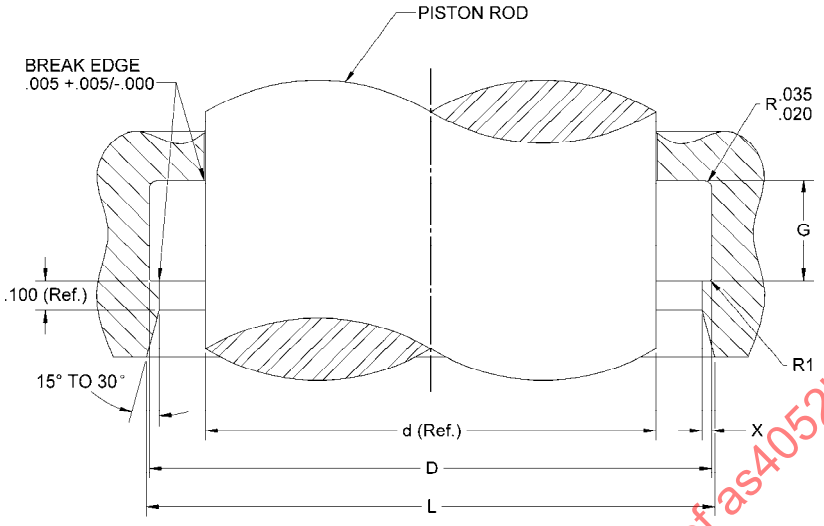

FIGURE 2 - TO ACCOMPANY TYPE 2 IN TABLE 2

TABLE 2 - TYPE 2 "CLICK FIT" GLAND DIMENSIONAL INFORMATION
ALL DIMENSIONS IN INCHES

Gland Size Code Dash No.	∅d Piston Rod O.D. Ref. +0.000 –0.002	∅D Gland I.D. +0.002 –0.000	∅L Lead In Diameter Minimum	X Retaining Lip. +0.005 –0.000	G Gland Length +0.010 -0.000	R1 Atmospheric Corner Radius Maximum
325	1.498	1.870	1.888	0.032	0.334	0.009
326	1.623	1.995	2.013			
327	1.748	2.120	2.138			
328	1.873	2.245	2.263			
329	1.998	2.370	2.388			
330	2.123	2.495	2.513			
331	2.248	2.620	2.638			
332	2.373	2.745	2.763			
333	2.498	2.870	2.888			
334	2.623	2.995	3.013			
335	2.748	3.120	3.138			
336	2.873	3.245	3.263			
337	2.997	3.369	3.387			
338	3.122	3.494	3.512			
339	3.247	3.619	3.637			
340	3.372	3.744	3.762			
341	3.497	3.869	3.887			
342	3.622	3.994	4.012			
343	3.747	4.119	4.137			
344	3.872	4.244	4.262			
345	3.997	4.369	4.387			
346	4.122	4.494	4.512			
347	4.247	4.619	4.637			
348	4.372	4.744	4.762			
349	4.497	4.869	4.887			